

# CHEMICALS

## Project Fact Sheet



## ACCELERATED CHARACTERIZATION OF POLYMER PROPERTIES

### BENEFITS

- Decreased cost of polymer development and manufacturing
- Reduced energy consumption in the plastics industry by 10 trillion Btu/year
- Ten-fold reduction in new product development and delivery times
- Broadened plastics applications through increased polymer performance
- Reduced environmental emissions and waste associated with the production and disposal of test polymer materials

### APPLICATIONS

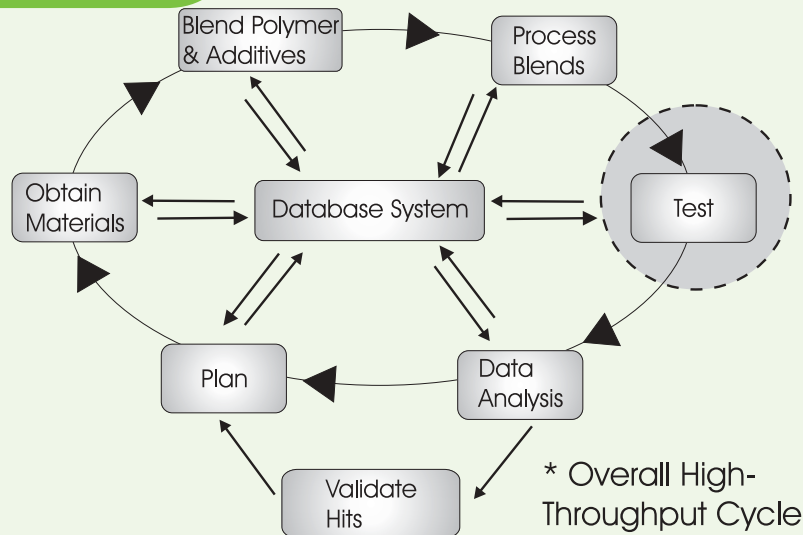
Implementation of this technology will result in polymers with enhanced end-use performance, driving plastics into new product lines and markets. It can be applied across the plastics industry, from resin and additive producers, to polymer research laboratories, to compounders and original equipment manufacturers.

## RAPID SELECTION OF ADDITIVES WILL REVOLUTIONIZE PLASTICS INDUSTRY

Additives are incorporated in polymers to achieve a variety of properties, such as structural, aesthetic, and flame resistant characteristics. They are an essential and often expensive part of many polymer formulations. Hundreds of combinations exist in each class of additives, and these additives often interact when combined in different ways. Because of these interactions, and multitude of additive possibilities and the cumbersome and costly process of evaluating their effects, the introduction of new additives technology is extremely slow. Many polymer formulations are simply not optimized because traditional additive packages are often utilized without revalidation for new products or applications, or further development is terminated once a moderate level of performance is achieved.

For polymer manufacturers, a suite of high-throughput microanalysis techniques that can rapidly measure polymer properties promises to pave the way for significant energy savings and product improvements. Such an approach is expected to revolutionize the polymer and polymer additives industry by making it possible to analyze greater combinations of polymer additives in less time, significantly reducing costs and product delivery times as well as improving production efficiencies.

### HIGH THROUGHPUT CYCLE



**High-throughput techniques enable rapid analysis of additive combinations and accelerate product development.**



## Project Description

**Goal:** To develop a suite of microanalysis techniques that can rapidly measure a variety of polymer properties of industrial importance.

Over the past 10 years, the new research technology called “combinatorial chemistry” or “high-throughput screening (HTS)” has seen exponential growth. The technology—a set of techniques for creating a multitude of compounds and rapidly evaluating them—has been widely adopted in the pharmaceutical industry over the past few years. In the proposed research, combinatorial methods will be applied to polymer research by developing non-destructive methods to rapidly test materials for polymer properties of interest. These properties will include thermal, photo-oxidative, antistatic, dielectric, and mechanical properties, among others. Modern micromanufacturing and imaging technologies will be used to create suites of analytical devices for analysis of libraries of polymer materials.

## Progress & Milestones

Significant progress has been made in the following areas:

- Selecting polymers of interest
- Developing rapid test methods

Future research will involve attaining the following milestones:

- Selecting key properties for microanalysis
- Developing advanced micromasurement techniques for polymer properties
- Generating a system development strategy
- Generating a technology commercialization plan

## Commercialization

The microanalysis methods developed will be commercialized as an analytical toolkit for measuring polymer properties. Dissemination of this enabling technology across the polymer and polymer-using industry will result in significant energy savings.



### PROJECT PARTNERS

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